



# **The Rational Response of a Regulated Transmission Company to a Low WACC**

**Report to Transpower**

**1 May 2014**

## **Acronyms and Abbreviations**

CAPM	Capital Asset Pricing Model
GRS	Grid Reliability Standards
IPP	Individual Price-quality Path
IRIS	Incremental Rolling Incentives Scheme
IT	Investment Test
WACC	Weighted Average Cost of Capital

## Table of Contents

<b>1</b>	<b>Introduction</b>	<b>1</b>
<b>2</b>	<b>The Link between WACC and Economic Welfare</b>	<b>3</b>
<b>3</b>	<b>The Role of WACC in Regulatory Settings for Electricity Transmission</b>	<b>8</b>
3.1	The Investment Test	8
3.2	Individual Price-quality Path	9
3.3	Specific Incentive Mechanisms	10
3.4	Grid Reliability Standards (GRS)	10
3.5	Summary of How WACC Interacts with Transpower's Other Regulatory Settings	11
<b>4</b>	<b>Response of Rational Transmission Company to a Decrease in WACC</b>	<b>13</b>
4.1	Economic Investments	14
4.2	Other Capital Expenditure	14
4.3	GRS-linked Investments	15
<b>5</b>	<b>How this Response Affects Consumers</b>	<b>16</b>
5.1	Foregone Economic Benefits	17
5.2	Higher Total Cost of Electricity Supply	18
5.3	Less Innovation	19
5.4	Degradation of Service Quality	19
<b>6</b>	<b>Conclusions and Next Steps</b>	<b>21</b>

## Tables

<b>Table 5.1: Summary of Effect of Behaviour Change on Consumers</b>	<b>16</b>
----------------------------------------------------------------------	-----------

## Figures

<b>Figure 2.1: Expenditure Hierarchy of Non-regulated and Regulated Suppliers</b>	<b>5</b>
<b>Figure 2.2: The Link between Decisions on WACC and Consumer Welfare</b>	<b>7</b>
<b>Figure 3.1: Elements of the Regulatory Regime that Applies to Electricity Transmission</b>	<b>8</b>
<b>Figure 4.1: Hierarchy of Investment Deferral Applied to Transpower</b>	<b>13</b>

## **Boxes**

<b>Box 5.1: Clutha Upper Waitaki Lines Project (Lower South Island Renewables Project)</b>	<b>17</b>
<b>Box 5.2: Queensland State Electricity Distribution</b>	<b>18</b>
<b>Box 5.3: FERC's ROE Incentives for Electric Transmission Investment</b>	<b>19</b>

## Executive Summary

The Commerce Commission (the Commission) is seeking input to its review of the cost of capital input methodologies (IMs) that apply under Part 4 of the Commerce Act. As part of this consultation, the Commission has asked interested parties to submit evidence or expert reports on the appropriate weighted average cost of capital (WACC) percentile to use in the IMs, and whether any additional factors exist that might affect the appropriate WACC percentile in different sectors.

This report examines the social costs that would arise in the specific circumstances facing Transpower if the regulated WACC was set too low, and why these costs would exceed the social costs of WACC being set too high. The findings in this report support the Commission's recognition "that the consequences of underinvestment in infrastructure by regulated businesses can have a more significant impact... in the long term than the consequences of excessive prices... in the short term".<sup>1</sup>

### **The value of this report is in identifying and articulating the linkages between a low WACC and changes in economic welfare**

We find that the main social costs could include a higher overall cost of providing electricity transmission services, fewer economic benefits in efficiently transmitting low-cost electricity generation to demand, and less innovation. There may also be low probability, high impact costs from a less reliable grid—although any changes in this area would be subtle and would take time to affect consumers.

We have not been able to develop quantitative estimates of these welfare changes for this report given the timeframe for consultation. However, the evidence we have gathered strongly suggests that erring on the higher side of the WACC range is likely to be in the long term interests of consumers.

### **As a regulated supplier, Transpower is able to defer expenditure**

Transpower needs to invest to meet regulatory standards, and has limited ability or incentive to avoid investment if doing so would directly compromise regulated reliability standards. However, investments in reliability only form part of the capital that Transpower spends. Other investments that help to promote the efficient operation of the grid and/or electricity system can be deferred or avoided, for example economic investments.

The ability to defer expenditure also exists for other regulated suppliers. This is because regulated businesses do not face pressure from other suppliers to maintain efficient expenditure levels that exists in workably competitive markets. Instead regulators seek to promote outcomes that are consistent with workably competitive markets by requiring regulated suppliers to meet quality standards. However, those standards will always be incomplete—creating an ability to defer expenditure that would be most efficiently spent today.

The ability to defer or avoid investment permits regulated suppliers (including Transpower) to mitigate some of the shareholder harm (or mitigate losses) that would occur if the regulated WACC falls below the true cost of capital (which we refer to as a "low WACC" in this report). This ability to avoid investment is efficient because it contributes to a lower cost of capital for regulated suppliers. Specific investment deferrals

---

<sup>1</sup> Commerce Commission, Authorisation for the Control of Supply of Natural Gas Distribution Services by Powerco Ltd and Vector Ltd Decisions Paper, 30 October 2008, paragraph 759.

will not be efficient if they increase the lifetime costs of providing electricity transmission services. However, the ability to change expenditure also means that a low WACC will not simply reduce the returns that shareholders receive—the tangible impact will be to change the expenditures made by regulated suppliers.

### **The extent and type of expenditure deferral depends on the regulatory regime**

The way that a regulated supplier responds to a low WACC will depend on the specifics of the regulatory regime that applies. For example, if quality standards are tightly defined and enforced, then opportunities for deferrals may be limited. Some investments are easier or preferable to defer than others, and suppliers would naturally defer those investments first. For example, we would expect investments that are not tied to the legal or regulatory obligations of the supplier to be the first investments deferred.

Another way of making this point is to say that decisions on WACC cannot be evaluated in isolation from other components of the regulatory regime.

### **The regulatory regime for electricity transmission explicitly balances a positive incentive to invest with protections to ensure efficient outcomes**

The Commission and interested parties have put considerable time and effort into developing and applying a set of regulatory arrangements that work together as a whole. At least four broad components of this regulatory regime have a direct impact on how a company in Transpower's position might respond to a change in WACC:

- The Investment Test under the capex IMs requires Transpower to prove the net economic benefits of any major capital project. Where an uplift in WACC provides a positive incentive to invest, the Investment Test provides balance by requiring Transpower to prove the net market benefit of capex proposals.
- The Individual Price-quality Path (IPP) requires Transpower to provide a rationale to support its expenditure proposals. Any positive incentive to invest more capital is balanced by the need to justify base capex and the ability of the regulator to review and ultimately reject Transpower's expenditure proposals.
- The specific incentive mechanisms that apply under the IPP encourage Transpower to minimise costs and provide specified outputs. In addition, these incentive mechanisms have been deliberately designed to make Transpower indifferent between spending capex and opex to promote an optimal mix of expenditure and provide the lowest 'whole of life' solution.
- The Grid Reliability Standards (GRS) require Transpower to invest to meet regulated standards of grid performance. Transpower applies the GRS to its network. The GRS rely on forecasts that reflect planning, judgement and attitudes towards risk. Changing WACC could change Transpower's approach to grid planning, potentially to favour solutions that incur opex rather than capex.

Overall, the current combination of regulatory tools appears to strike the right balance between a WACC set above the true unobservable WACC and the need to ensure efficient outcomes for consumers. Any change in WACC therefore needs to be assessed against the risk of reducing the effectiveness of other regulatory components.

### **A rational transmission company would respond to a fundamental shift in its regulatory settings**

How would a rational transmission company facing the regulatory settings described above respond to a low WACC? We use the construct of a "rational transmission

company” to avoid the complication that the actual response of Transpower (as with any company) will depend on idiosyncratic factors, such as management views, company culture, and specific shareholder preferences.

Overall, we find that a low WACC would encourage a rational transmission company to take available opportunities to defer or avoid capital expenditure. Specific ways this could be achieved include:

- Treating major capex proposals that have an “economic” rationale differently. The transmission company could look for other ways to finance these projects—such as through grid investment contracts at a higher agreed WACC, or simply by asking project beneficiaries to finance them. These options are not straight-forward to implement, and as a result economic investments could simply not take place
- Shifting expenditure away from capex and towards opex. This change in relative expenditures could be reversed at a future time if the regulated WACC was restored to a level that better reflected the true cost of capital
- Changing its perspective on how best to comply with the GRS. Again, a rational transmission company would look for opex solutions or non-network alternatives to comply with the GRS, and may alter its tolerance for risk. We would expect changes in this area to be subtle, but should be expected given the degree of professional judgement applied in grid planning.

#### **Economic welfare will be reduced by these changes in behaviour**

These behavioural changes would be likely to reduce overall welfare. The impact on consumers could include:

- Foregone economic benefits from having fewer economic investments designed to more efficiently transport electricity from low-cost generation sources to demand
- A higher total cost of electricity supply due to a shift at the margin towards less efficient capex or opex (and away from the most efficient capex solution). This would increase the whole of life costs of providing transmission services, and could create the need for periods of “catch up” investment
- Reduced value from innovative investments that are avoided due to the risk that expected benefits cannot be realised.

These impacts represent an overall loss of dynamic efficiency that flows from efficient investment being deferred to a future period, or not being made at all. While the immediate impacts may appear to create short-term cost savings by reducing capex, in the long run overall costs will be higher because expenditures are made in a less optimal way.

Other “low probability, high impact” outcomes are also possible. For example, constraining capital clearly has the potential over the long run to lead to lower levels of reliability. While system reliability is clearly a very high priority for Transpower, decreasing the financial attractiveness of investing could bring about subtle changes in approach to grid planning.

#### **Quantifying the size of the welfare loss will take further time**

These impacts on consumers are difficult to quantify—which explains why the Commission has previously relied primarily on conceptual arguments when determining how to choose a point in the WACC range under the IMs. However, the changes in

welfare described in this report are material and weigh against any change in approach that lowers the point estimate used for the regulated WACC.

One approach to quantify these impacts is to identify the economic value from expenditures that would be changed if suppliers only earned a low WACC on their capital. For example, the Investment Test analysis estimated that the Wairakei Ring economic investment will provide net economic benefits in the order of \$500 million over its life. This suggests that there would only need to be a 4 percent chance that the project did not proceed with a low WACC for paying the 75<sup>th</sup> percentile of the WACC range to be in consumers' interests. In other words, the net benefits foregone in that case far outweigh the cost of paying a higher WACC.

The same "bottom up" analysis can be applied across the range of investments made by regulated suppliers, or a single regulated supplier (such as Transpower).



# 1 Introduction

The Commerce Commission (the Commission) is seeking input to its review of the cost of capital input methodologies (IMs) that apply under Part 4 of the Commerce Act.<sup>2</sup> This consultation arises out of the High Court decision in *Wellington Airport v the Commerce Commission*.<sup>3</sup> In its decision, the High Court noted that despite strong support from the Commission’s experts for the use of the 75<sup>th</sup> percentile of the weighted average cost of capital (WACC) range in the IMs, there was a lack of empirical evidence for either selecting a mid-point WACC or a WACC well in excess of the mid-point.

Transpower has engaged Castalia to evaluate how a rational investor in electricity transmission in New Zealand would respond, given existing regulatory conditions, to the prospect of earning returns that are lower than its true (unobservable) cost of capital (which we refer to as a “low WACC” in this report). The analysis is based on the fact that selecting a lower WACC percentile will increase the probability that the regulated WACC will be lower than the true (unobservable) WACC.

The objective of this work is to contribute to the base of evidence on whether the social cost of under-investing in electricity transmission infrastructure is greater than the social cost of over-investing. This report directly responds to the Commission’s request for evidence in paragraph 24 of the consultation paper.

We approach this task by stepping through the following logical steps in this report:

- We present a conceptual framework for thinking about how decisions on the regulatory WACC affect economic welfare in Section 2. We conclude that WACC decisions form part of a set of regulatory arrangements that drive the behaviour of regulated suppliers. Changes in the behaviour of regulated suppliers in turn drive changes in welfare—both positive and negative
- In Section 3 we review the set of regulatory arrangements that apply to Transpower under the IMs and the company’s individual price-quality path (IPP). We highlight the important role WACC plays through interactions with other regulatory tools under the specific Part 4 arrangements that apply to Transpower
- We then provide our professional opinion on the likely effects of a low WACC on the decisions of a rational transmission company operating under Transpower’s regulatory arrangements in Section 4. We explore what options are available to a rational transmission company under current regulatory settings if a low WACC does not provide a “normal” return to shareholders
- We conclude in Section 5 by exploring how these rational responses could affect consumers through foregone efficiencies and the lifetime costs of providing electricity transmission services. Although direct comparisons are difficult, we provide evidence from previous New Zealand investments and overseas trends that indicate that when incentives to invest are distorted at the margin, the welfare costs can be high.

---

<sup>2</sup> See <http://www.comcom.govt.nz/regulated-industries/input-methodologies-2/further-work-on-wacc/>

<sup>3</sup> New Zealand High Court Decision 3289, <http://www.comcom.govt.nz/regulated-industries/input-methodologies-2/judgments/>

The Commission has asked for evidence on the appropriate WACC percentile that should be used under the cost of capital IMs. The material in this report goes some way to providing that evidence by showing how a regulated supplier in Transpower's position would change its behaviour in ways that would change welfare outcomes. Further work is required to develop quantitative estimates of these welfare changes. This was not possible within the timeframe provided for this consultation.

The focus of this report is electricity transmission. However, we would expect that a similar analysis could be undertaken for each sector regulated under Part 4 of the Commerce Act. The impacts across different regulated sectors may also be inter-related. For example, the decisions of electricity distributors affect the costs of providing electricity transmission, and vice versa.

While Transpower has provided technical input to support the preparation of this report, the views and conclusions expressed are those of Castalia.

## **2 The Link between WACC and Economic Welfare**

The Commission has asked interested parties to submit evidence or expert reports on the appropriate WACC percentile to use in the IMs, and whether any additional factors exist that might affect the appropriate WACC percentile in different sectors. Interpreting this evidence requires a clear conceptual framework on the link between decisions on WACC and welfare outcomes. As we explain in this section, this link is not always direct—and relies to a large extent on how regulated suppliers respond to changes in the regulatory WACC.

The conceptual framework presented in this section applies to any business regulated under Part 4 of the Commerce Act.

### **A rational capital investor expects to earn “normal” returns**

The WACC IMs uphold the principle that investors in regulated businesses should be compensated for the financial risks they face. The WACC IMs use the Capital Asset Pricing Model (CAPM) to estimate normal returns. Under CAPM, the risk of the investment compared to the market is reflected in the equity beta—if the equity beta is less than one, the investment is less risky than the market. The lower the risk, the lower the return required to attract investment. The approximate return required on an investment is also equal to the cost of raising capital from creditors and equity investors—the WACC.

Distortions will occur if the WACC used does not reflect the risk of the investment. In the investment decisions made by non-regulated businesses, if an investor does not adequately price all of the risks of an investment when determining WACC then loss making investment will occur. This is because WACC is commonly used as a “hurdle” rate and the net present value of the investment will be overstated.<sup>4</sup> In contrast, WACC is used by the regulator in regulated industries to set allowable returns, rather than evaluate the costs facing investors. As a result, if the regulatory WACC is set too low then suppliers will avoid investing and under-investment will occur. This is because regulated returns fail to compensate the shareholders of regulated suppliers for all of the risks they face.

These statements of principle apply to all regulated suppliers, not just Transpower. Shareholders expect to earn a normal return on the equity invested in the company.<sup>5</sup> The rate of return paid to shareholders needs to be sufficient to compensate them for the risks they are taking and to compensate them for foregoing other investment opportunities by having capital deployed in the regulated business.

### **Regulated suppliers can change their behaviour in response to changes in WACC**

As noted above, WACC errors have a different impact in regulated industries from other (non-regulated) commercial activities. Another important distinction exists in how risk is borne, and therefore what WACC represents.

In most commercial activity, shareholders bear the residual risk that returns will not compensate them for the risk assumed. This residual risk is captured in the equity beta—the greater the volatility of shareholder returns, the higher the equity beta. If revenues are

---

<sup>4</sup> Kruger, Phillip, Augustin Landier and David Thesmar, ‘The WACC Fallacy: The Real Effects of Using a Unique Discount Rate’, 2011.

<sup>5</sup> State-Owned Enterprise Act 1986, section 4(1).

not sufficient to provide a normal return, then the business can continue to operate (reflecting the willingness of shareholders to tolerate the cost of forgoing opportunities that do return WACC). However, if revenues fall below a certain level then the company risks being placed into statutory management or liquidation by its creditors.

Economic regulation by design should provide greater confidence to shareholders on the stability of returns. This is reflected in having a lower cost of capital than most other commercial activities:

- **A lower regulatory WACC reflects stable revenues.** The nature of the services provided by regulated suppliers (such as electricity) means that demand, and therefore revenues, do not fluctuate greatly relative to the demand for other goods and services
- **A lower regulatory WACC also reflects stable returns.** The economics literature and regulatory practice focuses less on the financial stability that shareholders enjoy because regulated suppliers have greater flexibility in their expenditure. However, this feature of regulation clearly contributes to more stable returns. The imperfect nature of service quality regulation means it provides scope for regulated suppliers to defer expenditure without necessarily degrading regulatory standards. Although this deferral is possible, it is inefficient and can worsen service quality and raise costs over the long-term. While non-regulated businesses can also defer expenditure when finances become tight, competitive pressure from other suppliers means that this is unlikely to be a profitable strategy for very long. Other market participants or new entrants will provide consumers with products or services at the quality that consumers demand (ultimately taking market share).<sup>6</sup> In contrast, the increased opportunity to defer expenditure provides regulated suppliers with a buffer that safeguards shareholder returns (at least in the near term), meaning that returns will not fluctuate as much as for non-regulated suppliers.

By benchmarking the volatility of returns of comparable businesses, the estimates of WACC made under the IMs capture both of these effects. However, acknowledging that the relatively low cost of capital borne by regulated suppliers has two distinct sources is important because it changes the way we think about how regulated suppliers respond to a fall in the regulated WACC. Regulated suppliers have no control over the stability of revenues when faced with a low WACC. However, they do have some control over the stability of returns.<sup>7</sup>

Figure 2.1 compares the expenditures of non-regulated and regulated suppliers. The return on equity provided by non-regulated businesses is inherently more volatile without a buffer of deferrable expenditure that can be used to safeguard shareholder returns. This buffer is provided by deferring efficient expenditure, which decreases immediate

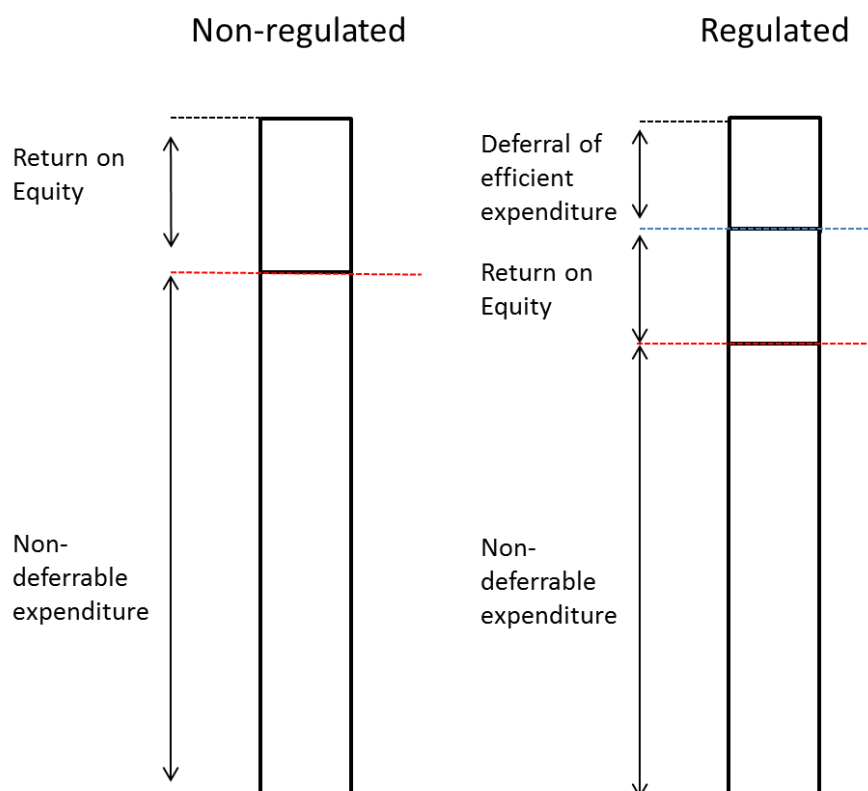
---

<sup>6</sup> While these arguments are generic to regulated suppliers (and not just electricity transmission), the distinction between deferrable and non-deferrable investment may be weaker where there are substitutes for the regulated supplier's service. For example, if Chorus does not invest adequately in its copper network in areas where other suppliers are rolling out fibre, or where Vodafone has cable network, it risks losing more customers. This is because customers can switch from copper services to cable or new (superior) fibre services. Similar substitution might also occur between copper and mobile network services. To the extent that fuel switching from gas to electricity is possible, then a similar dynamic may also exist for gas pipeline businesses. This moves towards the workably competitive market dynamic described above.

<sup>7</sup> A common theme from regulated suppliers, operating under the DPP/CPP regime is that, if they expected to earn less than a normal rate of return, they might reduce expenditure/investment, and degrade service quality, rather than apply for a CPP which they perceived as being risky.

expenditures but increases costs over the longer-term. This dynamic means that the return on equity required to attract investment is generally higher for non-regulated suppliers to compensate shareholders for the risks that they face.

**Figure 2.1: Expenditure Hierarchy of Non-regulated and Regulated Suppliers**



### Evidence from other regulated sectors on expenditure deferrals

The scope to defer expenditure was also evident from submissions made by regulated suppliers (EDBs) operating under the DPP/CPP regime. Suppliers have highlighted that reducing opex/capex may be a preferable option to applying for a CPP when the DPP is not sufficient to allow them to earn a normal rate of return.

For example, Unison has stated that where an EDB does not expect the DPP to enable it to earn a normal rate of return (the price path is set too low) “The EDB will face the choice of ... Cutting operating and capital expenditure to meet the shortfall (most likely operating expenditure as this has a more direct short-term impact on returns, whereas a large amount of capital expenditure has to be avoided to increase returns); or ... Applying for a CPP ... A prudent EDB is likely to take the first option ... an EDB is likely to defer capital and operating expenditure until a point is reached that the EDB can no longer sustainably meet the quality targets, placing consumers at risk of a less reliable network”.<sup>8</sup>

Vector has also identified opportunities to defer investment. Vector states in its 2013 Asset Management Plan that “Vector does not believe that the current allowed regulated rate of return adequately compensates shareholders for the risk associated with investing

<sup>8</sup> Unison, Submission on 2010 – 2015 Starting Price Adjustments Update Paper, 16 May 2010, paragraphs 25 and 26.

in electricity distribution businesses and, should the existing situation persist, it is therefore likely to reduce its network investments”.<sup>9</sup>

### **WACC is one (important) component of a set of regulatory arrangements**

The flexibility in the expenditure of regulated suppliers makes it important for regulators to understand how decisions on WACC might affect the behaviour of regulated suppliers. However, behavioural changes are not simply driven by WACC. WACC is just one (admittedly very important) component of a set of regulatory arrangements that seek to balance incentives to invest capital against other important regulatory objectives.

This means that a particular WACC decision cannot be taken in isolation as being good, bad, or indifferent. Whether WACC is sufficient to provide a normal return depends on how the other regulatory instruments that make up the regulatory regime allocate risk and penalise or reward regulated suppliers for performance.

The role of WACC within a set of regulatory arrangements is analogous to the role that return on equity (ROE) plays in long-term infrastructure contracts (such as Public Private Partnerships). The ROE that is negotiated in a Public Private Partnership contract and ultimately reflected in prices cannot be evaluated in isolation. To provide a normal return, the ROE needs to be consistent with the other terms of the contract – how risks are allocated, payments made, and disputes resolved.

### **How does this affect consumer welfare?**

The Commission is ultimately interested in how different approaches to estimating how WACC affects consumer welfare. On one side of the welfare loss function this relationship will be reasonably direct. Higher prices for regulated services may mean that consumers pay slightly higher prices than is needed to maintain efficient levels of service. This causes a loss in consumer welfare (some of which will be transferred to producers).<sup>10</sup> However, a direct link cannot be drawn on the other side of the welfare loss function between setting a low WACC and welfare impacts.

To understand how welfare will change if WACC is set too low, we first need to understand how the behaviour of regulated suppliers might change. The discussion above leads to the conclusions that:

- Economic regulation provides the scope for regulated suppliers to change their behaviour in response to WACC decisions
- Changes in behaviour will be determined by how WACC decisions fit alongside other components of the regulatory regime.

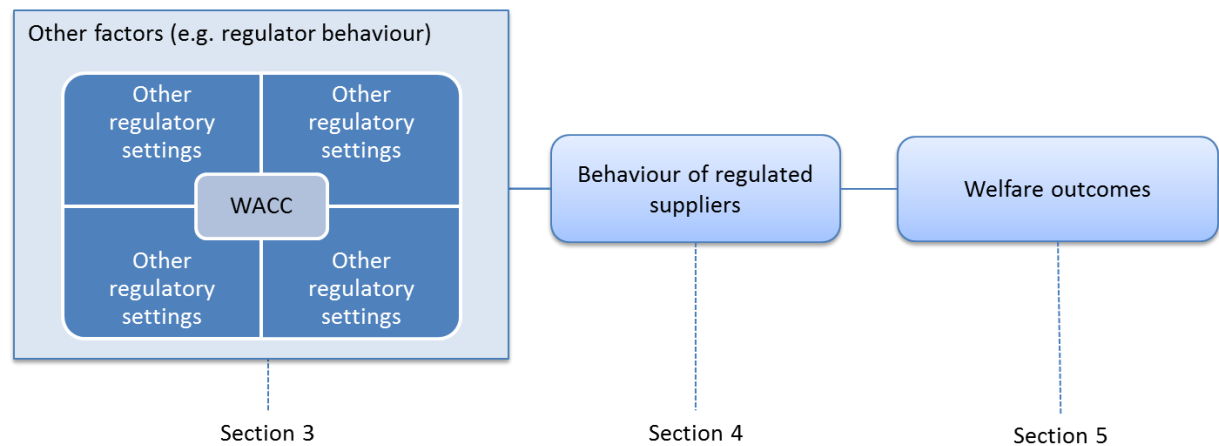
The figure below outlines the logic of how WACC decisions ultimately affect welfare. WACC is one regulatory parameter that affects the behaviour of regulated suppliers—but other regulatory settings also influence this behaviour and will determine how much flexibility exists to change behaviour. Welfare outcomes are then affected by the behaviour of regulated suppliers, and are therefore affected by the decisions made on WACC and other regulatory settings.

---

<sup>9</sup> Vector, Electricity Asset Management Plan 2013 – 2023, Section 9, Pages 15 and 16

<sup>10</sup> This is relatively straightforward to calculate. All that is needed to calculate this is: (i) the difference in maximum allowable revenue under different WACC percentile options, (ii) the level of pass-through to consumer prices; and (iii) elasticity of demand

**Figure 2.2: The Link between Decisions on WACC and Consumer Welfare**



We apply the logic shown in Figure 2.2 to Transpower's circumstances in the remaining sections of this report. In Section 3, we describe other important regulatory settings that sit alongside WACC. In Section 4, we evaluate how a rational transmission company could be expected to respond to a low WACC given the set of regulatory arrangements that currently apply to electricity transmission. Finally in Section 5, we assess how the predicted changes in supplier behaviour could affect consumers and ultimately change welfare outcomes.

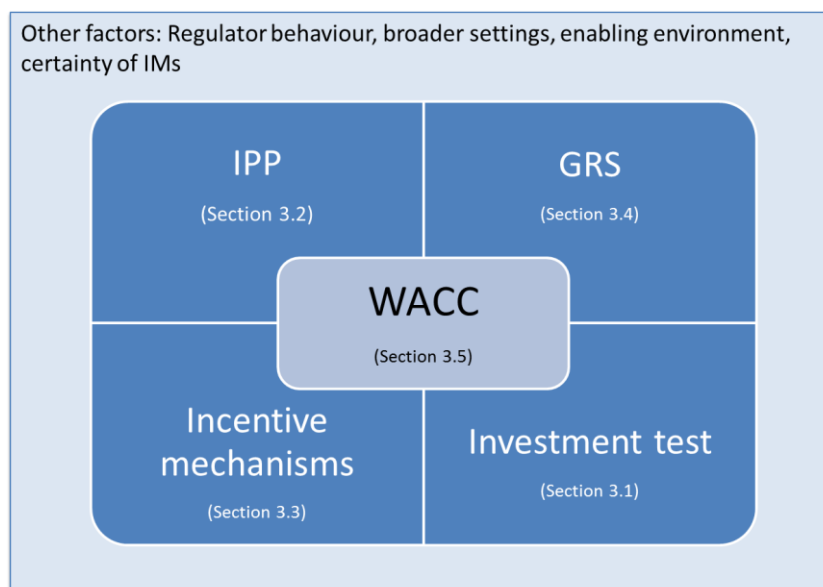
### 3 The Role of WACC in Regulatory Settings for Electricity Transmission

Electricity transmission has some specific characteristics:

- Transpower is the sole investor in electricity transmission and the sole operator of the electricity grid in New Zealand. As a result, Transpower has information and expertise that is not found in other organisations, including regulatory agencies
- Transpower's investment and operational decisions have a significant role on the performance of the electricity sector as a whole. While the investment decisions of other regulated suppliers are typically confined to particular regions, Transpower's decisions have broader nationwide impacts.

These characteristics are reflected in the unique set of regulatory arrangements that apply to Transpower to encourage an efficient level of investment and achieve other regulatory objectives.<sup>11</sup> Figure 3.1 illustrates what we see as the main regulatory mechanisms that regulate Transpower and interact with decisions on WACC. Each mechanism is described in this section. We then summarise what we see as the important interactions between the unique regulatory controls that apply to Transpower and decisions on WACC.

**Figure 3.1: Elements of the Regulatory Regime that Applies to Electricity Transmission**



#### 3.1 The Investment Test

As highlighted in the Commission's consultation paper, Transpower must apply to the Commission for approval of major capex proposals (defined as capital projects of more than \$20 million). The Commission must be satisfied that the electricity market benefits

<sup>11</sup> Frontier Economics "Evidence in support of setting allowed rates of return above the midpoint of the WACC range" (March 2014), p. 17-18, section 3.2.2



of the investment would exceed the costs before it will approve a proposed investment. The Investment Test is set out as Schedule D of Transpower's capital expenditure IMs.

Transpower has an Investment Test to confirm that specific investments are in the long-term interests of electricity consumers. This reflects the fact that from time to time significant capital needs to be put in to major projects—that the best result for consumers is for major projects to proceed when they are justified, rather than having more regular incremental capital investments. The Investment Test process also offers an opportunity for interested parties to provide information on the proposed investment, improving the quality of Transpower's investment decisions.

Transpower has some ability to change how regulation applies under the Investment Test. The Investment Test requires Transpower to make an application for the approval of major capex. The process therefore relies on Transpower being motivated to invest. As discussed below, Transpower has limited ability to defer or avoid investment required to meet the Grid Reliability Standards (GRS). However, the regulatory requirements do not compel Transpower to propose discretionary “economic” investments.

### **3.2 Individual Price-quality Path**

Transpower has an individual price-quality path (IPP), with specific mechanisms that aim to encourage a level and type of expenditure that is in the long-term interest of consumers. Transpower's current IPP runs from 1 April 2011 to 31 March 2015 (known as RCP1). Transpower has submitted expenditure proposals for the period from 1 April 2015 to 31 March 2020 (known as RCP2). The Commission will finalise its determination on the IPP that will apply during RCP2 by October 2014.

The IPP process adopts a conventional “propose-respond” model of economic regulation. Under this form of regulation, Transpower develops forecasts of operating and capital expenditure over the coming regulatory period, which are reviewed by the Commission and subjected to external scrutiny. This means the Commission undertakes full *ex-ante* reviews of Transpower's proposed level of operating expenditure and minor capital expenditure prior to the start of each regulatory control period.

This process is currently playing out for RCP2.<sup>12</sup> The Commission is reviewing Transpower's operating and capital expenditure proposals, and has put forward steps it will take should it conclude that Transpower's proposed expenditure does not meet the Commission's standard of efficient and prudent costs.

Professor George Yarrow has previously highlighted that the propose-respond regulatory model (as applied to Transpower) operates best when the regulated supplier faces the prospect that its capital expenditure might yield NPV>0 outcomes.<sup>13</sup> Professor Yarrow states: “My experience is that capex incentives only have prospect of success if (a) developed on a negotiated basis or the NSP has some choice (i.e. some degree of control) and (b) they are intended to have expected NPV > 0.”

In other words, Transpower's IPP only works if Transpower is incentivised to invest.

---

<sup>12</sup> See <http://www.comcom.govt.nz/regulated-industries/electricity/electricity-transmission/transpower-individual-price-quality-regulation/transpowers-price-quality-path-from-2015-to-2020/>

<sup>13</sup> See slide 8 <http://www.aemc.gov.au/Media/docs/Professor-George-Yarrow-presentation-16d60bf3-1dca-400a-8edf-6b40be0ec8d7-0.pdf>

### 3.3 Specific Incentive Mechanisms

Transpower also faces specific regulatory incentives under its price-quality path. In some cases, the Commission has proposed to extend the incentives that currently apply to Transpower to other regulated suppliers.<sup>14</sup> Specific expenditure incentives include:

- The **Incremental Rolling Incentives Scheme (IRIS)** that applies to Transpower's opex. The IRIS provides Transpower with incentives to pursue efficiency gains throughout the regulatory period. The IRIS allows Transpower to retain efficiency gains in controllable opex for five years spanning regulatory periods: for every dollar not spent, Transpower keeps 30 cents, for every dollar overspent they give back 30 cents
- **Base capex incentives.** The base capex expenditure adjustment provides a symmetric incentive because it applies to both over- and under-spending. Like the IRIS, which this incentive is designed to complement, the base capex expenditure adjustment encourages Transpower to pursue efficiency savings by allowing Transpower to retain part of the savings made (or cost increases incurred) over the coming years.

Working together, the IRIS and the base capex incentive ensure Transpower is broadly neutral as to whether it incurs operating expenditure or capital expenditure—as long as the regulated WACC is equal to the cost of capital. This indifference incentivises Transpower to select the lowest lifetime cost, rather than making opex versus capex trade-off decisions based on the nature of regulatory mechanisms in place at the time.

Transpower is also subject to four major capex project incentives:

- The efficiency adjustment rewards Transpower for efficiency gains
- The output adjustment penalises Transpower if it does not meet agreed outputs for a project
- The overspend adjustment penalises Transpower when more than the approved amount of capex is spent on a project
- The capex sunk costs adjustment allows Transpower to recover project costs in certain circumstances (such as when the project is abandoned for good reason).

These mechanisms incentivise Transpower to manage to costs of individual projects and ensure outputs are still delivered. The incentives are another important part of the regulatory regime that applies to Transpower. If the incentives are out of balance with other aspects of the regime, then they will not work as intended.

For example, a low WACC would bias Transpower against capex, even if this would provide the lowest whole of life cost to consumers. In an effort to maintain service levels, more opex may well be required—which Transpower would be prepared to spend because the neutrality between capex and opex would not be achieved.

### 3.4 Grid Reliability Standards (GRS)

The Grid Reliability Standards (GRS) in the Electricity Industry Participation Code (the Code) have a significant impact on Transpower's investment and operational decisions. The GRS establishes two “triggers” that determine when investment is required. The first

---

<sup>14</sup> See <http://www.comcom.govt.nz/regulated-industries/input-methodologies-2/amendments-and-clarifications/>

trigger requires Transpower to maintain N-1 on the core grid—meaning Transpower needs to ensure the system can continue to operate in a satisfactory state after any single *contingent event* on the core grid.<sup>15</sup> The second trigger requires Transpower to invest when the cost of investment would be outweighed by the value provided to consumers in providing greater reliability. This means that whenever Transpower determines it would be economic to invest to maintain service at a grid exit point/s,<sup>16</sup> then it must invest (or demonstrate that either consumers or the Electricity Authority have approved varying the service levels at that grid exit point).

The GRS are more prescriptive than the quality standards imposed on other regulated suppliers in New Zealand. For example, while Transpower and electricity distributors are currently subject to reliability standards under Part 4 regulation of the Commerce Act, these impose no direct obligation to invest to maintain or increase reliability.

Transpower has a role in applying the GRS standards. The requirement for Transpower to invest to meet the GRS needs to be understood in light of that role. Transpower is responsible for giving effect to the GRS through its role as grid planner. This role involves forecasting demand and evaluating when investment is needed to achieve the standards specified in the GRS. The grid planning methodologies and assumptions adopted by Transpower are themselves subject to regulation.

### **3.5 Summary of How WACC Interacts with Transpower's Other Regulatory Settings**

The regulatory mechanisms described above work together with decisions on Transpower's WACC to encourage efficient behaviour that is in the long-term interests of consumers. Overall, the decision in the current WACC IM to use a point in the WACC range that strengthens the incentive to invest is counter-balanced by other regulatory tools that help to ensure the right level and type of expenditure:

- The **Investment Test** is effective when Transpower submits proposals to the Commission that are shown to provide net public benefits. If Transpower is unable to recover its own cost of capital, then it may not have the intended incentives to test or execute investment proposals that would provide benefits to other parties, but would result in financial losses for Transpower
- Under the **IPP**, Transpower's individual expenditure forecasts are reviewed by the Commission under a propose-respond regulatory model. This works well when the party proposing the expenditure (Transpower) has a positive incentive to invest because the regulator can reject expenditure proposals. The regulatory logic breaks down when the regulator would prefer to see more investment in the proposals
- The **specific incentive mechanisms** that complement the IPP only provide the right incentives if Transpower has a positive incentive to invest. If WACC is set too low, then the healthy tension between spending capex and opex is upset. Transpower currently strives to (efficiently) minimise capex and opex, subject to achieving quality standards and an optimal balance between capex and opex. With a low WACC Transpower would still try to minimise its costs, but would have incentives to inefficiently suppress capex

---

<sup>15</sup> Contingent events are a specific set of events listed in the Electricity Industry Participation Code

<sup>16</sup> The Investment Test described in Section 3.1 is used to make this determination

- The **GRS** rely on forecasts that reflect planning judgement and attitudes towards risk. Changing WACC could change Transpower's approach to grid planning, potentially to favour solutions that incur opex rather than capex.

The overall conclusion that we draw from this brief summary of the regulatory settings for electricity transmission is that setting a WACC percentile well above mid-point provides an appropriate balance between incentivising investment and ensuring least-cost outcomes. This is perhaps not surprising given that this result was the Commission's explicit objective in determining Transpower's IMs, and considerable time and effort went into achieving this balance. While there will always be areas to improve and more time is needed for all of the regulatory arrangements to have the desired effects, overall the balance seems to be in the long-term interests of consumers.

## 4 Response of Rational Transmission Company to a Decrease in WACC

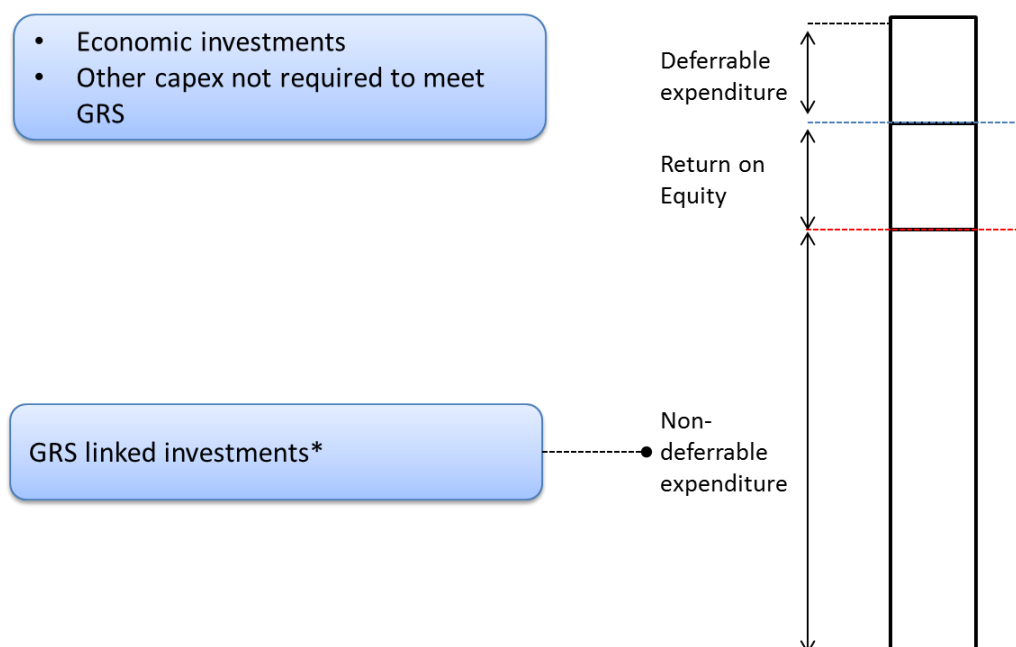
Given the balance achieved through the existing regulatory settings for electricity transmission, we now turn to examine how a rational transmission company would respond to a low WACC.

We use the term “rational transmission company” to focus on the behaviour of a regulated supplier that is strictly profit maximising. In reality, regulated suppliers (like individuals) have a range of possible responses to changes in their environment—and a number of factors will ultimately determine the actual response (including management views, company culture, and specific shareholder preferences). Adopting the assumption of rationality helps to establish a baseline for understanding how a firm in Transpower’s position might respond to a low WACC.

As described in Section 2, we would expect a rational transmission company faced with a low WACC to defer the most discretionary capital investments first.

Figure 4.1 applies the expenditure hierarchy for a regulated supplier to Transpower’s specific regulatory arrangements. In Transpower’s case, the most flexible investments would involve uses of capital that are not required to meet the GRS—investments with an “economic” (rather than “reliability” rationale), and investments made for other parties (connections investments). Some investments that would currently be identified through the GRS may be deferrable if Transpower changed its approach to applying the GRS, for example by identifying opex solutions that meet GRS (rather than committing more capital). We discuss these responses under the subheadings below.

**Figure 4.1: Hierarchy of Investment Deferral Applied to Transpower**



\*Note: While many GRS-linked investments will not be able to be deferred, a rational transmission company facing a low WACC would look for opportunities to commit less capital while meeting regulated standards (for example, by increasing opex to meet GRS)

## **4.1 Economic Investments**

Transpower has a regulatory obligation to identify economic investment opportunities under the Code. However, unlike reliability investments, there are no consequences for failing to make an investment that would have provided economic benefits. As a result, a rational transmission company that is made worse-off by making an economic investment would be unlikely to propose such an investment and subject it to the Investment Test.

The comment of Professor Yarrow cited in section 3.2 is relevant here: the propose-respond regulatory model operates best when the regulated supplier is motivated to invest. If the transmission company has no incentive to invest, then it could (at least in theory) limit the prospects for economic investment opportunities. This means that even if the transmission investment would provide significant benefits to other parties (and long-term benefits to consumers), the regulatory settings may not lead to the investment being made.

If the transmission company does not finance economic investments, then market participants could look for other ways to get the infrastructure built. For example:

- The transmission company could develop economic investments under grid investment contracts which are not subject to the regulated WACC. This would correct the incentive problem that arises from a low WACC by enabling the transmission company to specify the required return under the contract
- Economic investments could be financed by other parties, such as generators. This option has the obvious disadvantage that it foregoes any cost of capital advantage held by the regulated transmission company—meaning that fewer projects would be considered worthwhile. The parties providing the finance would also control the design of the project, potentially restricting its ability to maximise overall benefits.

Both of these options face coordination problems, and would only be feasible for investments with a small number of beneficiaries. Parties would have incentives to ‘free-ride’ on investments financed by other parties, making it difficult to get contributions to the investment. Investments with large net benefits may not be advanced due to these coordination and free-rider problems.

## **4.2 Other Capital Expenditure**

Transpower invests substantial capital every year outside the GRS and Investment Test process. Transpower has annual base capex of around \$250 million, made up of smaller investments in transmission lines and substations as well as communications, support, and in other areas such as demand response innovation. These investments are important to the efficient operation of the electricity system.

Under the regulatory arrangements described in Section 3, we would expect a rational transmission company to minimise base capex when a low WACC is present. For example, a rational transmission company could inefficiently spend smaller sums of capex or opex to achieve longer than optimal asset lives rather than replacing the asset at the optimal point.

The transmission company would naturally seek to avoid this capex without implementing opex solutions—which would allow it to retain any opex under-spend under the IRIS mechanism. If this was not possible, then the company would still be better off substituting capex for opex because it would effectively lose money on every

dollar of capital invested. If the balance between the regulated WACC and the actual cost of capital returned, then the transmission company would likely face a period of catch up investment to make up for the relative underinvestment during the years with a low WACC. The longer the period with a low WACC, the larger the investment “catch-up” that would be required.

Transpower also invests capital to connect parties to the transmission system under bilateral contracts (known as investment contracts). A rational transmission company would see these investments in a very similar light to economic grid investments described above. If the regulatory WACC is too low, the transmission company would either adjust the terms of the contract to recoup a higher WACC or would require the counterparty to finance the investment at its own cost of capital.

### **4.3 GRS-linked Investments**

The GRS and Investment Test provides obligations for the transmission company to invest to maintain N-1 and economic reliability. However, the parameters used to model the GRS (such as demand forecasts and Value of Lost Load) require an element of professional judgement. If the WACC is too low, a rational transmission company may seek to minimize the situations when the GRS calls for capital expenditure. This could be done by favouring smaller investments or opex solutions, even if that might result in higher whole of life costs.

Institutional incentives become particularly important when the exercise of professional judgement is required. We would expect any grid planning changes to be subtle and to have little apparent impact in the short and medium-term. However, a persistently low WACC could have an effect on the cost and quality of supply in the long-run.

## 5 How this Response Affects Consumers

Any changes in the regulatory WACC will change behaviour at the margin, with the most discretionary or flexible investments affected most. The changes in behaviour described in Section 4 will also each have different impacts on consumers, and ultimately on welfare. Furthermore, because many of the behavioural changes involve an element of accepting more risk to service quality, the impacts of a low WACC may not be discernible for some time.

In this section we assess how the behavioural changes resulting from a low WACC could translate into consumer impacts. Table 5.1 summarises the likely effect (and magnitude) that we would expect the changes in investment behaviour to have on consumers. We see identifying and describing these impacts as the first step in the process of understanding the welfare loss that arises under a low WACC.

**Table 5.1: Summary of Effect of Behaviour Change on Consumers**

Change in behaviour	Probability of change	Impact of change	Potential cost to consumers (change in welfare)
Reduction of economic investments (e.g. CUWLP, Pole 3)	<b>High:</b> no regulatory requirement to make economic investments	<b>Medium</b> (if +ve net market benefit) <ul style="list-style-type: none"> <li>Net economic benefits are foregone, or</li> <li>Projects face a higher cost of capital (for example under investment contracts)</li> </ul>	<b>High</b>
Reduction in other investments (e.g. asset management system and communications)	<b>High:</b> no regulatory requirement to spend base capex	<b>Medium</b> <ul style="list-style-type: none"> <li>Loss of efficiencies/innovation in systems, or</li> <li>Projects proceed with higher cost of capital</li> </ul>	<b>High</b>
Reduction of GRS investment (by finding opex solution or accepting risk) (e.g. NIGU and NAaN)	<b>Low:</b> regulatory requirement for grid to satisfy the GRS	<b>High</b> <ul style="list-style-type: none"> <li>Lower service quality</li> <li>Higher long term costs to provide reliable service</li> </ul> Net economic benefits foregone	<b>Medium</b>
Reduction of non-core grid economic investments (e.g. connection assets, BPE-HAY reconductoring)	<b>Low:</b> regulatory requirement, but some discretion over model inputs	<b>High</b> <ul style="list-style-type: none"> <li>Lower service quality</li> <li>Higher long term costs</li> </ul> Net economic benefits foregone	<b>Medium</b>

We describe the cost to consumers in more detail below, drawing on relevant examples from New Zealand and overseas.



## 5.1 Foregone Economic Benefits

Efficient investments in transmission can optimise the network from generator to consumer. Decreased economic investment will lead to a divergence from the least cost 'stack' of generation, transmission and distribution. The lost benefit to the consumer is higher than the avoided cost to Transpower because the consumer pays the total cost of supply and benefits greatly from an efficient supply chain. The consumer also loses more because economic investments only proceed when there is a net market benefit.

Consumers will bear costs from any decisions not to pursue investments that would pass the Investment Test. As explained in Section 4, several types of investment fall into this category with a low WACC—even if net benefits exist, Transpower would not have incentives to propose the investments if the WACC is set too low. By foregoing these economic benefits, in the medium to long-term consumers are missing out on potentially lower costs, and/or higher service quality.

The Wairakei Ring project provides a recent example of an economic investment that might have been avoided or deferred with a low WACC. This project involved running a new 220kV line from Wairakei to Whakamaru on the B line side of the Wairakei Ring. The Wairakei Ring transfers electricity northward, and provides southward transfer in dry years. It also transports existing geothermal generation out of the Wairakei area. The upgrade of the Wairakei Ring removed constraints in an area where significant renewable generation is proposed by a number of parties.

The Investment Test analysis for the Wairakei Ring estimated that the project cost of \$141 million would provide net market benefits of almost \$500 million in present value terms. This means that the impact of not proceeding with the investment is to forego \$500 million in net benefits to electricity consumers. By comparison, the difference in the cost of capital on \$141 million over 20 years between Transpower's 50<sup>th</sup> percentile and 75<sup>th</sup> percentile of the WACC range is around \$20 million. This suggests that there would only need to be a 4 percent chance that the project did not proceed with a low WACC to make the payment of the 75<sup>th</sup> percentile in consumers' interests in this case.

Another example of a project that could lower the total cost of electricity (in certain circumstances) is the Clutha Upper Waitaki Lines Project (described in Box 5.1).

### **Box 5.1: Clutha Upper Waitaki Lines Project (Lower South Island Renewables Project)**

The Clutha Upper Waitaki Lines Project (CUWLP) is an economic investment expected to cost around \$200 million. The project includes upgrading transmission lines to transport electricity north from generators located in the Lower South Island. The project was originally designed to transport electricity generated from wind farms slated for development in the Lower South Island (Project Hayes being the largest proposed wind farm). These projects have recently been cancelled. However, the potential closure of the Tiwai Point aluminium smelter means that the upgrade may still have economic value in transporting electricity north from existing generators that currently supply the smelter.

The investment analysis carried out by Transpower highlights that if the Tiwai Point smelter closes, then the investment will have net market benefits. Much of the benefit will be received by generators located south of the constraint that would occur after the smelter closes. The upgrade enables these generators to access higher prices for their output than would otherwise exist in an over-supplied market in the Lower South Island.

If Transpower does not ultimately propose the investment as a major capital project, then there is a risk that the project will not proceed. However, the fact that the benefits of the investment accrue to a relatively small number of parties means other options may be

possible. One possibility is that Transpower agrees a grid investment contract with the beneficiaries of the investment at a price that reflects Transpower's true cost of capital.

Another possibility is that Transpower implements the investment, but receives up-front funding from the beneficiaries. In this case, the cost of the project will reflect the cost of capital of the project's beneficiaries, which is likely to be significantly higher than Transpower's cost of capital. Every percent that the beneficiaries' cost of capital is higher than Transpower's would add a significant amount to the total cost of the project. There is also a risk that the beneficiaries could not agree on a solution. This is likely if the beneficiaries see value in holding out to reach a more favourable outcome—clearly if all parties adopt that strategy then an outcome cannot be reached.

## 5.2 Higher Total Cost of Electricity Supply

As mentioned above, sustained periods with capital constraints can lead to a period of “catch up” investment, which ultimately costs consumers more. This commonly occurs through “knee-jerk” reactions to risk events, which may or may not be related to the capital constraint—but which directly highlight the significant costs of under-investment. An example of this dynamic from Queensland is provided in Box 5.2 below.

### Box 5.2: Queensland State Electricity Distribution

In 2004, following a series of extended outages as a result of a significant storm season and hot weather, the Queensland Government asked an independent panel to report on the state's electricity distribution networks. The Electricity Distribution and Service Delivery for the 21st Century (EDSD) Report was delivered in July 2004.

The EDSD Report made a number of findings and recommendations. These recommendations were accepted by the Government and resulted in the establishment of minimum acceptable service levels and service quality standards. Broadly, these included achieving and maintaining an N-1 security standard on major network assets such as bulk supply substations, zone substations and sub-transmission feeders. The report also recommended an increased focus on network planning, better understanding of the networks, improved maintenance programs and better communication with consumers.

The EDSD Panel recognised the recommendations would result in significant capital and operating expenditure and changes to the regulatory framework, including the establishment of new service standards. However, the Panel considered these costs worthwhile at the time the recommendations were made.

A 2011 review of the 2004 standards found that “*The standards were originally introduced to improve the reliability of the network, but have driven excessive costs and resulted in a degree of over-engineering of the networks*”. The 2011 Review estimated that reductions in total capital expenditure across the NSPs of around \$3.6 billion and operating expenditure of a further \$1.4 billion could be achieved over a five-year period without any material change in the level of reliability or service standards.

Sources: Electricity Network Capital Program Review 2011, Detailed report of the independent panel. Independent Review Panel on Network Costs Electricity Network Costs Review Final Report

The Queensland distribution example illustrates how risk events (whether or not they are related to periods of underinvestment) can create political pressure to take action. This pressure can translate into a subsequent period of over-investment, which ultimately costs consumers.

Sub-optimal technical solutions also lead to higher total cost of supply. The incentive to minimise capex can lead to sub-optimal technical solutions, by providing an incentive to spend opex rather than capex and push asset lives beyond their efficient limit.

### 5.3 Less Innovation

A reduction in non-grid investment could include some of the more innovative programmes Transpower currently pursues, which would reduce the opportunity for improved services and efficiencies. Businesses need incentives to innovate because new solutions come with less certainty about the ability to realise benefits from the investment. As a result, many regulatory regimes explicitly incentivise innovation.

Transpower invests capital in a range of innovative solutions. For example, the automation of operational functions, grid control technologies, critical systems resilience, demand forecasting tools, condition monitoring technologies, secondary systems, and simulation tools. It is likely that some or all of these investments would be deferred under low WACC. As a result, consumers would not receive the benefits of new technologies—which again can take time to be realised, but can be significant over time.

### 5.4 Degradation of Service Quality

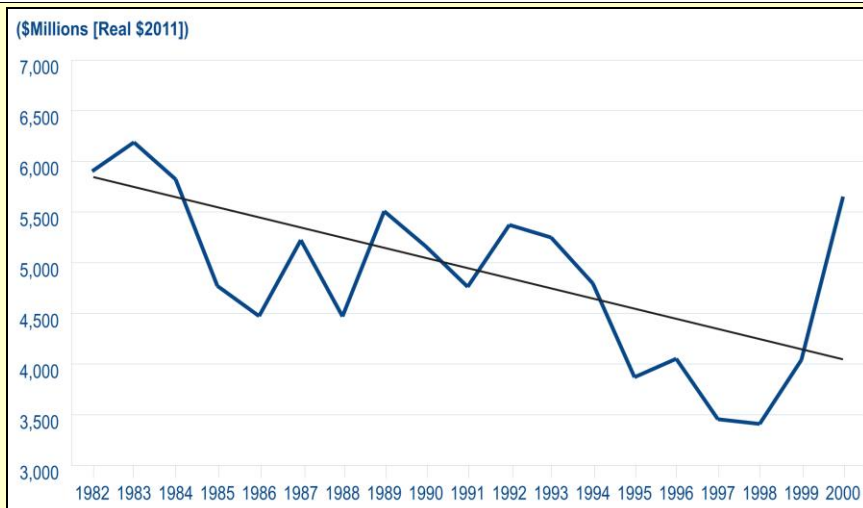
One of the features of long-lived infrastructure assets is that a reduction in capex is unlikely to materially affect service quality in the short term. This means that “sweating” the assets can be an effective short-term strategy for overcoming cashflow constraints or directing scarce capital towards highly valuable near-term opportunities. However, this is not a sustainable medium or longer-term strategy. In the medium-term, a lower level of investment will lead to an increased risk of service interruptions, due either to capacity shortages from failing to keep up with growing demand or through equipment failures.

There is some evidence from overseas that constraining capital investment into electricity transmission can have major service quality costs. Box 5.3 describes that the cause of the 2003 power outage in North-eastern states of the United States (one of the most costly infrastructure failures in history) was attributed by lawmakers to a period of under-investment in transmission in the United States.

#### **Box 5.3: FERC’s ROE Incentives for Electric Transmission Investment**

Throughout the 1980s and 1990s, transmission investment in the United States had continually declined. While this was the result of various prevailing economic conditions, most energy sector experts in the United States agree: investors did not face the right signals to continue to invest in essential energy infrastructure. By 2003, this lack of investment led to severe consequences. A forced generator outage, followed shortly thereafter by a transmission line fault, caused a cascading seven-hour blackout of the entire North-eastern grid. Suddenly, the need for additional transmission investment became a key policy focus for lawmakers.

#### **Transmission Investment by Investor-Owned Electric Utilities (1982–2000)**



The cost to consumers of this lack of investment was significant. Many of the costs of unreliable power supply fall in the commercial and industrial sectors, through lost business and the cost of lost productivity.<sup>17</sup>

In response to the 2003 blackout, the United States Congress included provisions in the Energy Policy Act of 2005 designed to provide the right incentives for reinvigorated investment in the transmission and bulk power systems. Among other new authorities, the Energy Policy Act granted the Federal Energy Regulatory Commission (FERC) the right to provide rate-based incentives for transmission owners and developers, including specific “adders” to a given company’s “base” allowed return on equity (ROE).

Specifically, FERC offers the following ROE incentives:

A 50 basis point adder for membership in a Regional Transmission Organization

A 100 basis point adder for transmission-only companies (transcos)

An adder of up to 200 basis points for projects that are deemed riskier than traditional transmission investments, due to significant siting and permitting challenges, or because the proposed investments use advanced technologies (such as HVDC and dynamic line ratings).

These adders have the net effect of boosting a given project’s ROE well above the moderate return that it would otherwise receive under FERC’s estimation methodology. Notably, in a 2012 policy statement FERC further qualified the availability of incentives, effectively indicating that FERC may be tightening the criteria for some of these incentives—although it maintained its commitment to encouraging transmission investment.

Sources: Edison Electric Institute. 2013. *Transmission Investment: Adequate Returns and Regulatory Certainty Are Key*. FERC, 2005. Promoting Transmission Investment through Pricing Reform. 113 FERC 61,182. FERC. 2012. Promoting Transmission Investment through Pricing Reform. 141 FERC 61,129.

<sup>17</sup> Kristina Hamachi LaCommare and Joseph H. Eto, ‘Understanding the Cost of Power Interruptions to U.S. Electricity Consumers’, 2004.

## 6 Conclusions and Next Steps

The evidence provided in this report leads us to agree with the Commission that “... the social costs associated with underestimation of the cost of capital in a regulatory setting involving constraining prices to end users ... are likely to outweigh the short-term costs of overestimation (i.e. if the cost of capital is set too low, the incentives for suppliers to undertake efficient investment will be reduced, which would be inconsistent with the long-term benefit of consumers)”.<sup>18</sup>

In many respects, this reflects the imperfect nature of economic regulation which creates opportunities to inefficiently defer investment, or simply not to invest at all. Looking at specific opportunities in the area of electricity transmission highlights the magnitude of likely social costs. A single investment (the Wairakei Ring) is estimated to provide net market benefits of almost \$500 million in present value terms. By comparison, the difference in the cost of capital on \$141 million over 20 years between Transpower’s 50<sup>th</sup> percentile and 75<sup>th</sup> percentile of the WACC range is around \$20 million. This means that there would only need to be a 4 percent chance that the project did not proceed with a low WACC to make the payment of the 75<sup>th</sup> percentile in consumers’ interests.

Extending this logic and analytical approach to all of the deferrable expenditures described in this report would provide a more complete, “bottom up” assessment of impacts. This would require aggregating all of the benefits that would be lost due to having a low WACC, and evaluating how likely investment deferral would need to be to justify the costs of a higher WACC.

---

<sup>18</sup> Commerce Commission, Input Methodologies (Electricity Distribution and Gas Pipeline Services) Reasons Paper, December 2010, paragraph H1.31



T: +1 (202) 466-6790  
F: +1 (202) 466-6797  
1747 Pennsylvania Avenue  
NW 12th Floor  
WASHINGTON DC 20006  
United States of America

T: +1 (646) 632-3770  
F: +1 (212) 682-0278  
200 Park Avenue Suite 1744  
NEW YORK NY 10166  
United States of America

T: +61 (2) 9231 6862  
F: +61 (2) 9231 3847  
36 – 38 Young Street  
SYDNEY NSW 2000  
Australia

T: +64 (4) 913 2800  
F: +64 (4) 913 2808  
Level 2, 88 The Terrace  
PO Box 10-225  
WELLINGTON 6143  
New Zealand

T: +33 (1) 45 27 24 55  
F: +33 (1) 45 20 17 69  
7 Rue Claude Chahu  
PARIS 75116  
France